

Table 4 shows the number of hearings in our sample.¹⁶ Tables 5 and 6 present data on participation, by demographic group, using alternative definitions of participation. Table 5 shows the number of parties to applications considered in hearings, broken out by race and gender, and the percentage of each group of the total number of participants in these 230 comparative hearings. Table 6 is similar to table 5 except that it shows the number of applications where a group has at least 1 party of a given demographic group participating in the application.

Table 4.
Number of Comparative Hearings in Sample by Type of Hearing

Radio and Television	230
Radio	155
AM	25
FM	130
Television	75

We can see from Tables 5 and 6 that there were 3082 parties in 740 applications in these 230 hearings. 91.1% of all participants were white while 8.9% were minority. Of the minority participants, about 43.1% are Black, 48.8% are Hispanic, 4.5% are Asian, and 3.7% are American Indian.¹⁷

Men made up 79% of all parties while females made up 21%. A strict comparison of the number of minority and female participants to the population at large would indicate low minority and female participation in the hearing process. While we have described earlier that this is not an appropriate comparison for the purposes of Croson, it does demonstrate that for at least the first dimension of the comparative hearing process, participation; minority ownership of broadcast stations is probably low because of low participation rates. This says nothing about the issue of whether the comparative hearing award process was fair or not.

Table 5.
Participation (number of parties in applications) by Minority Status and Gender
in Broadcast, Radio, and TV Comparative Hearings

¹⁶ We define a hearing as consisting of two or more applications. We define each application as consisting of one or more parties. For our purposes the word "party" and the word "individual" are synonymous.

¹⁷ It is assumed that the discrepancy between total minority reported and the sum of the finer reporting level (by race) is equally distributed across the race categories.

	Broadcast (Radio&TV)		Radio		Television	
Total Parties	3082		1526		1556	
	Headcount	Percent	Headcount	Percent	Headcount	Percent
White male	2262	73.4%	1060	69.4%	1202	77.2%
White female	546	17.7%	306	20.1%	240	15.4%
Minority male	182	5.9%	105	6.9%	77	4.9%
Minority female	92	3.0%	55	3.6%	37	2.4%
White	2808	91.1%	1366	89.5%	1442	92.7%
Minority	274	8.9%	160	10.5%	114	7.3%
Black	106	3.4%	67	4.4%	39	2.5%
Hispanic	120	3.9%	70	4.6%	50	3.2%
Asian	11	0.4%	4	0.3%	7	0.4%
American Indian	12	0.4%	8	0.5%	4	0.3%
Male	2444	79.3%	1165	76.3%	1279	82.2%
Female	638	20.7%	361	23.7%	277	17.8%

* minorities do not add exactly to total because sometimes, parties only indicated minority status and failed to specify the details of which minority group they were in.

Table 6.
Participation (Number of applications) by Minority Status and Gender in
Comparative Hearings (with at least 1 party in this demographic group)

Total applications	Broadcast (Radio&TV)		Radio		Television	
	740	Percent	494	Percent	246	Percent
White male	662	89.5%	439	88.9%	223	90.7%
White female	332	44.9%	213	43.1%	119	48.4%
Minority male	90	12.2%	48	9.7%	42	17.1%
Minority female	67	9.1%	41	8.3%	26	10.6%
White	705	95.3%	474	96.0%	231	93.9%
Minority	122	16.5%	72	14.6%	50	20.3%
Black	50	6.8%	31	6.3%	19	7.7%
Hispanic	57	7.7%	30	6.1%	27	11.0%
Asian	8	1.1%	3	.6%	5	2.0%
American Indian	10	1.4%	6	1.2%	4	1.6%
Male	694	93.8%	458	92.7%	236	95.9%
Female	374	50.5%	239	48.4%	135	54.9%

VI. Win Rates and Participation Rates by Race, Gender in Comparative Hearings

In calculating win rates and disparity ratios, it is critical to determine which applicant actually won each hearing. The data indicating which applicants won the comparative hearings come from either the Broadcast Applications Processing System (BAPS) database or the Administrative Law Judge Listing. This data is also confirmed in the manual data collection operation where we retrieved information directly from archived comparative hearing documents. On occasion, the decision of the ALJ to award a license to a particular applicant is appealed to a higher court and there is a reversal of a decision. We have conducted the additional data collection necessary to capture these post comparative hearing reversals. In our sample of 230 hearings, this occurred 15 times.

Tables 7 through 12 show counts of the number of parties by race and gender who have participated in applications that won in a comparative hearing. The tables also show participation rates, win rates, and disparity ratios, both unadjusted and adjusted for differences in the population of areas where the licenses were granted. Population weighted participation and win rates are shown in tables 8, 10, and 12. These rates are

designed to determine if there has been any difference in the win or participation rates according to the value of the license, where the value of the license is proxied by population of the area in which the license is awarded. Population data that are used as weights come from U.S. Census data.¹⁸

There are two relative win rate measures in the tables. Relative win rate (party basis) is simply the number of winning parties in the group divided by the total number of participants of that group. Relative win rate (equity basis) is similar, except that wins are determined based on which group has majority equity. Relative win rate (equity basis) can differentiate between a win with minority participation but no equity, and a win with participation and equity. Wins with substantial equity participation are accorded higher weight than wins with little or no equity participation.

The tables also show each group's share of winners and share of participants. To the extent that the share of winners exceeds the participation share, the group is winning at a higher rate than would be dictated by their participation alone. To the extent that a participation rate exceeds winning share, then the group is winning less often than their participation would dictate. Based on these definitions, table 7 shows that over all hearings, non-minorities are winning at slightly lower rates (90.1% vs. 91.1%) than their rate of participation while minorities are winning at slightly higher rates (9.9% vs. 8.9%) than their participation rate.

By type of service, as shown in tables 9 and 11, there is a slightly different story. Because there does not appear to be any difference between participation and win rates in radio (0% difference between win rates and participation rates for both non-minorities and minorities) but slightly higher win rates relative to participation for minorities in TV (9.2% win rates versus 7.3% participation rate).

Both white females (19.7% vs. 17.7%) and minority females (3.5% vs. 3%) are winning at higher rates than their participation rate. White males are winning at slightly lower rates (70.5% vs. 73.3%) than their participation rates, while minority males (6.3% vs. 5.9%) are winning at a slightly higher rate than their participation rate.

This story changes slightly when participation and wins are weighted by population. Weighting by population elevates the importance of participation and wins in higher population areas. While there is not much impact on the results for broadcast as a whole, the population weighting affects the results for radio. For radio, after weighting for population, minorities do a little bit worse than non-minorities and females do a little bit worse than males. The differences between participation and win rates after weighting by population are too small to suggest that any sort of bias is occurring in the award process for radio licenses such that minorities would not be as likely to win in higher population areas.

¹⁸ Place and County Subdivision Population Estimates,
<http://www.census.gov/population/www/estimates/citypop.html>

Table 7.
Win Rates and Participation Rates (By race and gender) – Broadcast

Total parties	3082							
Winning Parties	# of Wins	# parties	Relative win rate (party basis)	Relative win rate (equity basis)	Absolute win rate	% of winners	% participation	Disparity Ratio: %winning + %participation
White male	825	2262	36.5%	30.9%	26.8%	70.5%	73.4%	.96
White female	229	546	41.9%	36.1%	7.4%	19.6%	17.7%	1.11
Minority male	75	182	41.2%	40.9%	2.4%	6.4%	5.9%	1.09
Minority female	41	92	44.6%	32.5%	1.3%	3.5%	3.0%	1.17
White	1054	2808	37.6%	31.8%	34.2%	90.1%	91.1%	.99
Minority	116	274	42.3%	38.1%	3.8%	9.9%	8.9%	1.11
Black	51	106	48.1%	44.1%	1.7%	4.4%	3.4%	1.29
Hispanic	47	120	39.2%	37.5%	1.5%	4.0%	3.9%	1.03
Asian	5	11	45.5%	69.4%	0.2%	0.4%	0.4%	1.00
American Indian	2	12	16.7%	7.1%	0.1%	0.2%	0.4%	.500
Male	900	2444	36.8%	31.7%	29.2%	76.9%	79.3%	.97
Female	270	638	42.3%	35.5%	8.8%	23.1%	20.7%	1.12

Relative win rate (party basis) = # winning parties in-group / # of parties in-group.

Relative win rate (equity basis) = winning equity in group / total equity for group

Absolute win rate = # winning parties in-group / total # of parties.

% of winners = # of winners / total number of winners

% participation = # of parties / total parties

Disparity ratio = % of winners / % participation

Table 8.
Population Weighted Win Rates (By race and gender) – Broadcast

Group	Population Weighted		Disparity Ratio %winning + %participation
	% of winners	% participation	
White male	71.4%	75.3%	.95
White female	17.5%	14.7%	1.19
Minority male	8.8%	7.9%	1.11
Minority female	2.3%	2.1%	1.10
White	88.9%	90.0%	1.0
Minority	11.1%	10.0%	1.11
Black	6.1%	4.8%	1.27
Hispanic	3.0%	4.1%	.73
Asian	0.5%	0.6%	.83
American Indian	0.2%	0.2%	1.0
Male	80.2%	83.2%	.96
Female	19.8%	16.8%	1.18

% of winners = # of winners / total number of winners – weighted by population in area of license

% participation = # of parties / total parties – weighted by population in area of license

Disparity ratio = % of winners / % participation

Table 9.
Win Rates and Participation Rates (By race and gender) – TV

Total parties	1556							
Winning Parties	# of Wins	# parties	Relative win rate (party basis)	Relative win rate (equity basis)	Absolute win rate	% of winners	% participation	Disparity: %winning + %participation
White male	440	1202	36.6%	29.4%	28.3%	72.6%	77.2%	.94
White female	110	240	45.8%	39.4%	7.1%	18.2%	15.4%	1.18
Minority male	36	77	46.7%	36.7%	2.3%	5.9%	4.9%	1.20
Minority female	20	37	54.0%	22.7%	1.3%	3.3%	2.4%	1.38
White	550	1442	38.1%	30.7%	35.3%	90.8%	92.7%	.98
Minority	56	114	49.1%	32.6%	3.6%	9.2%	7.3%	1.26
Black	23	39	59.0%	39.2%	1.5%	3.8%	2.5%	1.52
Hispanic	22	50	44.0%	32.1%	1.4%	3.6%	3.2%	1.13
Asian	3	7	42.9%	39.8%	1.9%	0.5%	0.4%	1.25
American Indian	1	4	25.0%	4.3%	0.1%	0.2%	0.3%	.67
Male	476	1279	37.2%	30.1%	30.6%	78.5%	82.2%	.95
Female	130	277	46.9%	35.6%	8.4%	21.5%	17.8%	1.21

Relative win rate (party basis) = # winning parties in-group / # of parties in-group.

Relative win rate (equity basis) = winning equity in group / total equity for group

Absolute win rate = # winning parties in-group / total # of parties.

% of winners = # of winners / total number of winners

% participation = # of parties / total parties

Disparity ratio = % of winners / % participation

Table 10.
Population Weighted Win Rates (By race and gender) – TV

Group	Population Weighted		Disparity Ratio: %winning ÷ %participation
	% of winners	% participation	
White male	74.0%	80.1%	.92
White female	18.6%	15.3%	1.22
Minority male	5.2%	3.2%	1.63
Minority female	2.1%	1.3%	1.62
White	92.6%	95.5%	.97
Minority	7.4%	4.5%	1.62
Black	1.9%	1.5%	1.27
Hispanic	3.2%	2.0%	1.60
Asian	0.5%	0.4%	1.25
American Indian	0.2%	0.2%	1.00
Male	79.2%	83.3%	.95
Female	20.8%	16.7%	1.25

% of winners = # of winners / total number of winners – weighted by population in area of license

% participation = # of parties / total parties – weighted by population in area of license

Disparity ratio = % of winners / % participation

Table 11.
Win Rates and Participation Rates (By race and gender) – Radio

Total parties	1526							
Winning Parties	# of Wins	# parties	Relative win rate (party basis)	Relative win rate (equity basis)	Absolute win rate	% of winners	% participation	Disparity Ratio: %winning + %participation
White male	385	1060	36.3%	31.7%	25.2%	68.3%	69.5%	.98
White female	119	306	38.9%	35.1%	7.8%	21.1%	20.1%	1.05
Minority male	39	105	37.2%	44.0%	2.6%	6.9%	6.9%	1.00
Minority female	21	55	38.2%	38.0%	1.4%	3.7%	3.6%	1.03
White	504	1366	36.9%	32.4%	33.0%	89.4%	89.5%	1.00
Minority	60	160	37.5%	41.9%	3.9%	10.6%	10.5%	1.01
Black	28	67	41.8%	46.4%	1.8%	5.0%	4.4%	1.14
Hispanic	25	70	35.7%	42.9%	1.6%	4.4%	4.6%	.96
Asian	2	4	50.0%	75.0%	0.1%	0.4%	0.3%	1.33
American Indian	1	8	12.5%	8.2%	0.1%	0.2%	0.5%	.40
Male	424	1165	36.3%	32.6%	27.8%	75.0%	76.3%	.98
Female	140	361	38.8%	35.5%	9.2%	24.8%	23.7%	1.05

Relative win rate (party basis) = # winning parties in-group / # of parties in-group.

Relative win rate (equity basis) = winning equity in group / total equity for group

Absolute win rate = # winning parties in-group / total # of parties.

% of winners = # of winners / total number of winners

% participation = # of parties / total parties

Disparity ratio = % of winners / % participation

Table 12.
Population Weighted Win Rates (By race and gender) – Radio

Group	Population Weighted		Disparity Ratio: %winning + %participation
	% of winners	% participation	
White male	58.3%	56.0%	1.04
White female	11.8%	12.1%	.98
Minority male	27.0%	26.7%	1.01
Minority female	2.9%	5.2%	.56
White	70.1%	68.1%	1.03
Minority	29.9%	31.9%	.94
Black	27.4%	17.8%	1.54
Hispanic	2.0%	12.4%	.16
Asian	0.1%	1.4%	.07
American Indian	0.1%	0.1%	1.00
Male	85.2%	82.7%	1.03
Female	14.7%	17.3%	.85

% of winners = # of winners / total number of winners – weighted by population in area of license

% participation = # of parties / total parties – weighted by population in area of license

Disparity ratio = % of winners / % participation

In addition to the relatively simple win rates defined above, we developed a relatively more sophisticated measure of potential win rate disparity referred to as the “relative award rate (R)”. The relative award rate for minorities is the percentage of license awards to minorities relative to average minority participation. The relative award rate R is defined by the following equation:

$$R = \frac{1}{N} \sum_{i=1}^N (z_i - m_i) = \frac{1}{N} \sum_{i=1}^N z_i - \frac{1}{N} \sum_{i=1}^N m_i$$

where N is the number of hearings, i indexes hearings, z_i takes a value of one if the license in hearing i is awarded to a minority and zero if not, and m_i is the percentage of minority applicants in hearing i . The relative award rate is defined analogously for non-minorities, males, and females. These calculations take place across the 230 hearings. The determination of whether a hearing is won by a minority is dependent upon the count of minorities in the winning application versus the number of non-minorities in the winning application. When the number of minorities in the winning application exceeds the number of non-minorities, the winning application is considered as

minority. Similarly when the number of females in the winning application exceeds the number of males, the winning application is considered as female.

The calculation of the relative award rate is also performed using equity as the determinant of control of the application.

The value of R must lie between one and minus one. If minorities are on average awarded licenses in proportion to their participation, R will be zero. Thus, we define “no disparity” as $R = 0$. If minorities are awarded licenses less than suggested by their percentage of applications, R will be negative. If minorities are awarded licenses more than suggested by their percentage of applications, R will be positive.

The measure R has the statistical advantage, among the more sophisticated measures we considered, of being defined as a population mean. For a population of hearings, we can estimate the population mean of R by taking a sample of hearings, determining minority status for each application and for the winning application in each sampled hearing, and computing the sample mean corresponding to R . The sample mean is an unbiased and consistent estimator of the population mean R . Further, if the sample is drawn randomly the sampled hearings are independent, and the variance of the sample mean can be derived and computed with relative ease. The sample mean and variance can be used to perform a statistical test of the hypothesis that $R = 0$, i.e. the hypothesis of no disparity.

In contrast to some other measures that are presented later, such as the “winner take all win rates”, the relative award rate is calculated over hearings and measures success in hearings relative to average participation in hearings.

This is our preferred measure because the calculation of R is based on the relative minority participation within a *hearing*. This controls for competition within hearings of different sizes (number of applications) and places minority participation and win rate within the context of its particular hearing. Other measures presented in this paper do not take advantage of hearing groups but, rather, calculates win rates for applications and parties as if they are independent of one another.

Table 13 presents the relative award rates for All Broadcast, TV, and Radio for non-minorities, minorities, males, and females (using the count of participants in each group as the determinant of which group controls the winning application).

Table 13.

Relative Award Rates
(Using majority based on body counts to define winning group)

	All Broadcast	TV	Radio
Male	.09	.09	.09
Female	-.09	-.09	-.09
Non-minority	.014	.01	.015
Minority	-.014	-.01	-.015

Table 14 presents the relative award rates for All Broadcast, TV, and Radio for non-minorities, minorities, males, and females (using the majority equity definition as the determinant of which group controls the winning application).

Table 14
Relative Award Rates
(Using majority based on equity to define winning group)

	All Broadcast	TV	Radio
Male	.02	.03	.02
Female	-.02	-.03	-.02
Non-minority	.003	.02	-.006
Minority	-.003	-.02	.006

According to these two tables, the relative award rates for males are higher than those for females. The non-minority relative award rates are slightly higher than minority based on using a definition where the counts of the parties from each group in the application determine the winning group of the application. Using the alternative definition where the group with the most equity is defined as the winner of the winning application, there is little difference between non-minorities and minority relative award rates.

Standard errors for the estimates in Tables 13 and 14 are shown in Table II.1 in appendix II. Calculation of the 95% confidence intervals for these estimates suggests that there is a statistically significant difference between the male and female relative award rates shown in Table 13 (where the count of parties in each group determines the group who controls the winning application). This is the only instance where there is a statistically significant difference in any of these relative award rates. There are no statistically significant difference between the relative award rates for minorities and non-minorities.

It is important to note here that the period examined in this study was the period during which the FCC awarded credit for minority or female participation.¹⁹ Thus, one might expect that minorities and women would have similar success rates to non-minorities.

VII. Win Rates and Disparity Ratios by Race and Gender, Based on Definition of Control

Table 15 shows the number of applications that each group controls from an equity perspective. We refer to the number of these applications as “winner take all” since we make an assumption that if this application wins, then it is a win for this particular group.

We classify a particular group as controlling an application if and only if that group owns greater than 50% of the equity associated with an application. We classify a particular group as having won a hearing in a winner take all setting if and only if that group owns greater than 50% of the equity in the winning application for that hearing.

According to this definition of control, non-minorities control 670 or 90.5 % of all applications while minorities’ control 70 or 9.5 % of all applications. For radio, non-minorities control 451 or 91.3% of radio applications and minorities control 8.7%. For television, non-minorities control 89% of TV applications and minorities control 11%.

Table 15.
Applications where Group has Majority Equity
(by Gender and Minority Status)

	All Broadcast	Participation Share	Radio	Participation Share	TV	Participation Share
Total	740		494		246	
Non-minority	670	90.5%	451	91.3%	219	89%
Minority	64	8.6%	38	7.7%	26	11%
Male	600	81.1%	385	77.9%	215	87.4%
Female	109	14.7%	79	16.0%	30	12.2%

*Ties are excluded from these counts so shares will not sum to exactly 100%.

By gender, females have majority ownership for 109 or 14.7% of applications, which is split between 79 (16%) for radio and 30 (12.2%) for TV. Males control 600 or 81.1% of applications, which is split between 385 (77.9%) for radio and 215 (87.4%) for TV.

Table 16 shows the number of winning applications controlled by each group (see panel 1), and the total number of applications controlled by each group (see panel 2) where

¹⁹ See footnote 8

control is defined as owning greater than 50% of equity. It also shows the total number of applications with participation by each group, regardless of control (see panel 3).²⁰ The number of applications (panel 1) will be used as the numerator in an alternative measure of relative win rates and disparity ratios while number of applications in panels (2) and (3) will be used as the alternative availability measures for the denominator of the relative win rates and disparity ratios.

Table 16.
Winner Take All Applications
(Applications by Gender and Minority Status where Group has Majority Equity)

	Winning (1)			Total (2) (Narrow Availability Measure)			All Apps Regardless of Control (3)* (Broad Availability Measure)		
	All	Radio	TV	All	Radio	TV	All	Radio	TV
Non-minority	213	145	68	670	451	219	705	474	231
Minority	24	17	7	64	38	26	122	72	50
Male	191	125	66	600	385	215	694	458	236
Female	38	28	10	109	79	30	374	239	135

* This measure has the property that applications will have no unique classification for any one group. Counts for each demographic group in (1) and (2) are based on having majority equity in an application. Counts in (3) are based on having any participation by a demographic group in an application. Counts in (1) and (2) exclude ties.

Table 17 presents a relative win rate based on the winner take all definition of success and using the narrow measure of availability, i.e. only the applications for which the demographic group has majority equity. Table 17a shows the disparity ratio using the narrow measure of availability.

Table 17.
Winner Take all Relative Win Rate using
Narrow Availability Measure (1) / (2)

	All Broadcast	Radio	TV
Non-minority	31.8%	32.2%	31.1%
Minority	37.5%	44.7%	26.9%
Male	31.8%	32.5%	30.7%
Female	34.9%	35.4%	33.3%

These calculations are based on data from Table 16; e.g.
Minority TV $7/26=26.9\%$.

²⁰ Participation, in this instance, is simply defined as the presence of at least 1 party of that demographic group in an application.

Table 17a.
Disparity Ratio Using
Narrow Availability Measure

	All Broadcast	Radio	TV
Non-minority	.98	.97	1.01
Minority	1.16	1.35	.88
Male	.99	.98	.99
Female	1.08	1.07	1.07

Disparity ratio = % winning / % availability

e.g. .Minority Broadcast = $(24/237) / (64/734) = 1.16$

Table 18 shows a relative win ratio based on the winner take all definition of success and using a broader measure of availability than the measure used in Table 17. Based on this measure, minority and female controlled applications have a lower probability of winning a license than non-minority and male controlled applications. Table 18a shows the corresponding disparity ratio. The broader measure of availability is based on including all applications with representation in the group, regardless of who controls the application from an equity perspective. The idea behind this ratio is that availability should include all who are ready, willing, and able to bid on a license.

Table 18.
Winner Take all Relative Win Rate using
Broader Availability Measure (1) / (3)

	All Broadcast	Radio	TV
Non-minority	30.2%	30.6%	29.4%
Minority	19.7%	23.6%	14.0%
Male	27.5%	27.3%	28.0%
Female	10.2%	11.7%	7.4%

These calculations are based on data from Table 16; e.g.

Minority TV: $7/50=14\%$

Table 18a.
Disparity Ratio using
Broader Availability Measure (1) / (3)

	All Broadcast	Radio	TV
Non-minority	1.05	1.03	1.10
Minority	.69	.80	.52
Male	1.28	1.24	1.37
Female	.47	.53	.36

Disparity ratio = % winning / % availability

Based on using the broader definition of availability in the relative win rates and disparity ratios, there is a statistically significant difference between both non-minority and minority relative win rates and disparity ratios and between male and female relative win rates and disparity ratios. The results from Tables 18 and 18a rely on broader definitions of availability that includes all those who have participated in the process, regardless of whether they have the capability of controlling the application from an equity perspective.

VIII. Level of Competition within Hearings

While another part of the analysis, which is presented in a companion report, will control for various differences in the characteristics of applicants, we will also provide here some basic data on the level of competition within hearings, i.e. the number of applications of various groups within hearings. The purpose of presenting these data is to get an idea of how competitive each hearing is based on the number of applicants. It will be interesting to determine if there are any differences in the number of applications in hearings with and without minority participation.

The following tables show the average number of parties in applications and the average number of applications in hearings by minority status and gender. Examination of these averages may be suggestive of the odds of winning a hearing based solely on the number of competing applications.

Table 19.

Average number of parties in applications by Race and Gender

	All Broadcast	Radio	TV
All Applications	4.2	3.1	6.3
White	4.3	3.1	6.6
Minority	5.9	4.5	7.9
Male	4.4	3.2	6.5
Female	5.5	4.2	8.0

Averages are based on using only applications with
at least one party that is in group

Based on all applications, there tend to be more parties in applications with minority or female representation than there are for applications with white parties (5.9 for minority, 5.5 for female, and 4.3 for white). This is a sizable difference. For winning applications, the difference is even greater; there are 8.3 parties in winning applications with minority representation, 6.5 parties for winning applications with female representation, and only 5 parties for winning applications with white representation.

Table 20
Average number of parties per winning application
by Race and Gender

	All Broadcast	Radio	TV
All Applications	4.9	3.4	8.0
White	5.0	3.5	8.3
Minority	8.3	4.8	13.0
Male	5.1	3.6	8.4
Female	6.5	4.5	10.2

Averages are based on using only applications with
at least one party that is in group

Table 21

Average number of minority parties per winning application
by Race and Gender

	All Broadcast	Radio	TV
All Applications	.5	.4	.7
White	.4	.2	.7
Minority	2.3	2.1	2.7
Male	.5	.4	.8
Female	.7	.4	1.1

Averages are based on using only applications with
at least one party that is in group

Table 22
Average Number of white parties per winning application
by Race and Gender

	All Broadcast	Radio	TV
All Applications	4.4	3.1	7.2
White	4.6	3.3	7.6
Minority	5.9	2.8	10.3
Male	4.6	3.2	7.6
Female	5.9	4.1	9.2

Averages are based on using only applications with
at least one party that is in group

Table 23 shows that there are also differences between the number of applications in hearings with and without minority participation. For those hearings where a minority is represented within an application, there are on average 3.7 applications per hearing. For those hearings with female participation, there are an average of 3.4 applications per hearing, while for those hearings without minority participation, there is an average of 3.2 applications per hearing. This suggests that the odds of winning a license may be lower in hearings with minority or female participation.

Table 23

Average Number of Applications per Hearing
by Race and Gender (where there is at least one party of type)

Hearing with at least one party	All Broadcast	Radio	TV
White	3.2	3.2	3.3
Minority	3.7	3.8	3.5
Male	3.2	3.2	3.3
Female	3.4	3.4	3.4

Averages are based on using only applications with
at least one party that is in group

The corresponding average number of applications per hearing when there is at least one application in the hearing that is controlled by a group is shown below. Recall that control is defined as having greater than 50% equity.

Table 24
Average Number of Applications per Hearing
by Race and Gender (where group has control)

Group with at least one application	All Broadcast	Radio	TV
White	3.3	3.2	3.3
Minority	4.0	4.0	4.2
Male	3.3	3.2	3.3
Female	3.9	3.9	4.0

These results are similar to those in the previous table. It appears that minority and female controlled applications may face more competition in the form of a greater number of competing applications in the comparative hearing.

**Appendix I: Information Collected from Form 301 for the Development
of Utilization Ratios**

General Hearing Information

1. Docket number
2. Number of Applications
3. Community
4. Channel
5. Frequency
6. Service (select one): ☐ AM ☐ FM ☐ TV

APPLICATION (form 301) INFORMATION

For each Application:

1. Name of Applying Organization:
2. Number of Parties
3. Date Application Filed
4. Winner ☐ Yes ☐ No
5. Merger ☐ Yes ☐ No
6. Dismiss: ☐ Yes ☐ No
7. Appeal: ☐ Yes ☐ No

For Each Party to an Application:

1. Party Name
2. Party number
3. Position
4. Ownership (percentage of ownership)
5. Voting (percent of control)
6. Gender (pick one) ☐ Male ☐ Female
7. Minority status: ☐ Yes ☐ No
8. Race/Ethnicity: ☐ Black ☐ Hispanic ☐ Asian ☐ American Indian/Eskimo

Appendix II. Standard Deviations of Estimates Presented in Tables

Note that all of the ratios, averages, and other calculations presented in this memo are not exact calculations generated from the population of comparative hearings. Instead, all of these calculations are estimates based off of a sample of comparative hearings drawn from the population.

For this reason, when discussing the results of this memo it is necessary to account for the uncertainty associated with any estimate. This uncertainty is stated in terms of the standard deviation of the estimate. Let us refer to the estimate as “p” and the standard deviation as “s”. Then, for each of the estimates in this memo, it is appropriate to state that we are 95% confident that the true population value lies in the range:

$$[p - 1.96 * s, p + 1.96 * s]$$

Hence, knowing the standard deviation associated with each estimate is critical. The standard deviations associated with several of the more central estimates are provided in Tables II.1 and Table II.2. Table II.1 provides the standard deviations for several of the win rates presented in the report. Table II.2 provides the standard deviations for several of the averages presented in the report.

Note that the standard deviations of the population proportions in Table II.1 are relatively straightforward to calculate. These population estimates are in the form of a binomial estimate. The standard deviation of a binomial estimator is simply a function of the sample proportion and the sample size.

The calculation of the standard deviation associated with the winning percentages in Table II.1, on the other hand, is complicated. The winning percentages are in the form of ratio estimates. The standard deviation of a ratio estimate is a complicated function of the sample variances and co-variances of components of the ratio calculation and the sample size.²¹

We accounted for the finite sample size correction when calculating the standard deviations of the population proportions and the estimates of the winning percentages.

²¹ See Cochran, William G., Sampling Techniques, New York: John Wiley & Sons, Inc., 1977 page 164, formula 6.44 for the estimate, and formula 6.45 for the variance of the estimate.

Table II.1
Standard Errors Associated with Selected Estimated Rates

Estimates	Standard Deviations		
	All Broadcast	TV	Radio
Relative win rate for non-minority males	0.76%	0.92%	1.46%
Relative win rate for minority males	2.11%	6.09%	0.97%
Relative win rate for white females	1.96%	2.23%	3.68%
Relative win rate for minority females	5.63%	10.03%	3.59%
Relative win rate for non-minorities	0.71%	0.86%	1.37%
Relative win rate for minorities	2.05%	5.23%	1.00%
Relative win rate for blacks	2.69%	8.92%	1.18%
Relative win rate for Hispanics	3.28%	7.74%	1.69%
Relative win rate for Asians	6.54%	13.43%	3.64%
Relative win rate for American Indians	20.40%	22.64%	43.45%
Relative win rate for females	1.85%	2.20%	2.79%
Relative win rate for males	0.72%	0.92%	1.04%
Participation rate for white males	0.60%	0.70%	1.01%
Participation rate for minority males	0.37%	0.31%	0.90%
Participation rate for white females	0.49%	0.63%	0.66%
Participation rate for minority females	0.20%	0.20%	0.45%
Participation rate for whites	0.42%	0.36%	0.95%
Participation rate for minorities	0.42%	0.36%	0.95%
Participation rate for blacks	0.30%	0.21%	0.78%
Participation rate for Hispanics	0.27%	0.25%	0.67%
Participation rate for Asians	0.11%	0.11%	0.24%
Participation rate for American Indians	0.06%	0.07%	0.07%
Participation rate for females	0.52%	0.65%	0.77%
Participation rate for males	0.52%	0.65%	0.77%

Table II.1 (cont.)
Standard Errors Associated with Selected Estimates

Estimates	Standard Deviations		
	All Broadcast	TV	Radio
Party defined winning differential (table 13)			
Minority	1.07%	2.00%	1.50%
Non-minority	1.07%	2.00%	1.50%
Female	1.67%	2.50%	2.20%
Male	1.67%	2.50%	2.20%
Equity defined winning differential (table 14)			
Minority	1.20%	2.20%	1.30%
Non-minority	1.20%	2.20%	1.30%
Female	1.70%	2.70%	2.20%
Male	1.70%	2.70%	2.20%
Winner Take All (Narrow Measure – table 17)			
Minority	2.70%	2.77%	3.94%
Non-minority	1.29%	1.69%	1.67%
Female	1.16%	1.27%	1.64%
Male	1.26%	1.65%	1.64%
Winner Take All (Broader Measure – table 18)			
Minority	4.22%	4.76%	5.87%
Non-Minority	1.34%	1.76%	1.73%
Female	2.80%	4.73%	3.29%
Male	1.42%	1.77%	1.88%

Table II.2
Standard Errors Associated with Selected Estimated Averages

Estimate	Standard Deviations		
	All Broadcast	TV	Radio
Average parties per application			
all apps	0.17	0.38	0.14
When at least one party is:			
Minority	0.63	1.26	0.58
White	0.17	0.40	0.14
Male	0.17	0.39	0.14
Female	0.28	0.59	0.24
Average parties per winning app			
Overall	0.38	0.96	0.28
When at least one party is:			
Minority	1.33	2.50	1.03
White	0.40	0.99	0.30
Male	0.41	1.01	0.30
Female	0.60	1.32	0.47
Average apps per hearing			
Overall	0.13	0.24	0.16
When at least one party is:			
Minority	0.28	0.42	0.38
White	0.13	0.25	0.16
Male	0.13	0.25	0.16
Female	0.15	0.28	0.18

Consider some examples how uncertainty impacts the interpretation of the estimates in this report. Consider the (unweighted) relative win rate for whites, 37%, and minorities, 36.9%. The standard deviation associated with the measure for whites is .76%, a very small standard deviation. The standard deviation associated with the corresponding estimate of the minority win rate is a larger 2.11%. This implies that we can be 95% sure that the true population relative win rate for whites falls in the range (35.48%, 38.52%). The corresponding range for minorities is (32.68%, 41.12%). The measure for minorities is less precise because there are fewer minority parties in our sample.

Note that there exists significant overlap between the two 95% confidence intervals stated in the above example. This implies that we can not reject the hypothesis that the two true population relative win rates (the one for whites and the one for minorities) are equal to each other. In fact, this inability to reject the hypothesis of equality applies to a significant percentage of all the "win rates" stated in this memo.

Consider the example of the winner take all relative win rate, for all broadcast hearings, with the broader definition of availability. Using the statistics in Table 18, the win rate

for whites is 30%, with a standard deviation of 1.29% (see Table II.1) and the win rate for minorities is 21%, with a 2.8% standard deviation. This implies that we can be 95% certain that the true population value for whites falls in the range (27.42%, 32.58%) and the true population for minorities falls in the range (18.42%, 26.6%). Note that these confidence intervals do not overlap. Hence, we can assert, with 95% confidence, that the true population values for these two statistics are not equal. Using the same methodology one can show that there is a statistically significant difference between the win rate for men and women for the same specified win rate formula.